National Institute of Environmental Health Sciences

Projected impacts of climate change on environmental suitability for malaria transmission in West Africa

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Abstract:

Background: Climate change is expected to affect the distribution of environmental suitability for malaria transmission by altering temperature and rainfall patterns; however, the local and global impacts of climate change on malaria transmission are uncertain. Objective: We assessed the effect of climate change on malaria transmission in West Africa. Methods: We coupled a detailed mechanistic hydrology and entomology model with climate projections from general circulation models (GCMs) to predict changes in vectorial capacity, an indication of the risk of human malaria infections, resulting from changes in the availability of mosquito breeding sites and temperature-dependent development rates. Because there is strong disagreement in climate predictions from different GCMs, we focused on the GCM projections that produced the best and worst conditions for malaria transmission in each zone of the study area. Results: Simulation-based estimates suggest that in the desert fringes of the Sahara, vectorial capacity would increase under the worst-case scenario, but not enough to sustain transmission. In the transitional zone of the Sahel, climate change is predicted to decrease vectorial capacity. In the wetter regions to the south, our estimates suggest an increase in vectorial capacity under all scenarios. However, because malaria is already highly endemic among human populations in these regions, we expect that changes in malaria incidence would be small. Conclusion: Our findings highlight the importance of rainfall in shaping the impact of climate change on malaria transmission in future climates. Even under the GCM predictions most conducive to malaria transmission, we do not expect to see a significant increase in malaria prevalence in this region.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3801455

Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES), Other Climate Scenario

Special Report on Emissions Scenarios (SRES) Scenario: SRES A1

Other Climate Scenario: A1B

Exposure :

weather or climate related pathway by which climate change affects health

Precipitation, Temperature

Temperature: Fluctuations

Geographic Feature: ☑

resource focuses on specific type of geography

Desert

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Africa

African Region/Country: African Region

Other African Region: West Africa

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Malaria

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Mitigation

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Outcome Change Prediction

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Children

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content